Abstract

Background: Diabetic nephropathy is a serious complication of T1D (type one diabetes mellitus). Persistent hyperglycemia and subsequent hypomagnesemia is believed to develop kidney damage by activation of oxidative stress. We conducted this study to investigate the renoprotective effect of magnesium sulfate (MgSO4) on renal histopathology and oxidative stress in diabetic rats.

Methods: The study included 70 male rats. The animals were divided into seven groups: control (CRL), control receiving MgSO4 (CRL +Mg1 & CRL + Mg8), diabetic (DM1 & DM8) and diabetic receiving MgSO4 (DM + Mg1 & DM +Mg8). Rats were given 20 mg/kg (i.p) Streptozocin (STZ) for 5 consecutive days in (MLD) multiple low doses to induce T1D. At day 10 treatment groups were received MgSO4 (10 g/l) in drinking water, for 1 or 8 weeks. The blood glucose, BUN and creatinine levels were measured. Renal tissue levels of malondialdehyde (MDA) were measured by thiobarbituric acid (TBA) method to evaluate the oxidative stress. Renal histopathology was done using H & E staining method.

Results: Treatment with MgSO4 significantly decreased the blood glucose in DM+ Mg1 and DM +Mg8 groups as compared with DM1 and DM8. Magnesium treatment also decreased serum BUN and tissue level of MDA significantly in both short and long term treatment. The body weight loss and kidney weight to body weight ratio was improved by MgSO4. Histological results showed there were no differences between DM and DM +Mg groups.

Conclusion: Our findings showed that diabetic nephropathy is associated with high blood glucose level and oxidative stress (significant increase in MDA level). The renal dysfunction and oxidative stress can be improved by magnesium sulfate administration. It is suggested that protection against development of diabetic nephropathy by MgSO4 treatment involves changes in the blood glucose and oxidative stress.

Keywords: Diabetes mellitus type 1, Streptozocin, Diabetic nephropathy, Oxidative stress